THE

AGRICULTURAL BULLETIN

OF THE

FEDERATED MALAY STATES.

No. 5.] DECEMBER, 1913. [Vol. II.

PADI EXPERIMENTS IN KRIAN.

By E. Bateson.

The importance of extending the cultivation of padi in the F.M.S., and the benefits which would accrue therefrom to both the capitalist and the peasant class, are now too generally recognised to need emphasising. To create suitable conditions for padi-growing irrigation is essential, and with the carrying out of the several schemes projected by Government, the next decade will see a great advance in the right direction. At present these schemes exist on paper only, but their execution will no doubt be proceeded with before long, and it seems therefore an opportune moment to make known certain results of the Krian experiments which have a bearing on the irrigation of padi land.

Irrigation Methods.

Abandoned Areas in Krian.

The Krian irrigation scheme, the only one of any size in this country, has now been in operation for seven years. It has certainly added greatly to the prosperity of the district, but it can hardly yet be called a complete success, since there are large areas, forming a by no means inconsiderable part of the total amount of land under irrigation, which it has been found impossible to cultivate at a profit.

These areas have been a source of loss to the natives, who, with surprising perseverance, have taken up holdings year by year, only to desert them on finding that they would not yield even a bare subsistence. They have also caused a waste of Government money, as there has been very little return for the original outlay on irrigation channels and the annual charges for repairs, besides which the whole of the land has had to be flooded every year for the sake of the few people who have remained in occupation of their fields.

The area of this kind which has attracted most attention is a stretch of about 9,000 acres lying between Parit Buntar and Bagan Serai. It was supposed that its unproductiveness was due to the fact that the soil had been ruined by continual inundation before adequate facilities for drainage were provided, and on this assumption experiments in reclamation by means of draining, ploughing and liming were commenced. The prospect, however, did not appear very hopeful. The disinclination of the Malay for hard work is only too well known, and, besides, the average ryot cannot afford to wait longer than a few months for a return either from his labour or from the investment of his small capital. Had it been necessary, therefore, to subject every field to a slow process of reclamation before padi in paying quantities could be obtained, most of this land would have remained untenanted, and it might have been necessary in the end to cut it out of the irrigated area.

Happily, it proves that no slow and laborious methods of soil improvement are needed in order to make the land yield remunerative crops. All that is necessary is the practice of a more rational system of irrigation. It appears never to have been realised that the water requirements of the padi plant vary at different stages of its growth, and that a depth of water which may be excellent for mature padi is fatal to newly transplanted seedlings. Hence every year there has been wholesale destruction of padi by deep water, and it is entirely to this cause that the lamentable succession of failures shown by the crop records for this land is to be attributed.

Careful control of the irrigation water has an almost magical effect on the yield. A striking example is furnished by the following table of yields from a block of land on the Siakap road near Bagan Serai, which was experimented on last season and was previously cultivated by Malays:

Year.	Area planted.	Total crop.	Yield per acre.
1911.	27.5 acres.	1,405 *gantangs**	51 *gantangs**
1912.	31.0 „	2,265 „	73 „
1913.	31.9 „	11,167 „	350 „

Increases on a similar scale to the above were obtained at other places, distant several miles from one another; and although the improved yield did not always reach 350 *gantangs* an acre, in no case was it appreciably lower than 200 *gantangs*. On a rough estimate, three quarters of the land in the area in question will yield over 300 *gantangs* an acre, and the remaining quarter about 200 *gantangs*. Instead, therefore, of the almost negligible crop it has previously given, the whole area would, under proper conditions

*gallons.

of irrigation, yield between two and three million *gantangs* of padi, or approximately 6,000 tons, and would maintain some 2,000 families.

The idea that so long as water was supplied the depth was immaterial seems to have influenced officials in dealing with another extensive piece of land at Kubu Gajah, in the *mukim* (parish) of Gunong Semanggol. An abundant supply of irrigation water is available, but no channels have been made to remove possible surpluses after rain. At the planting season this year the depth of water was between two and a half and three feet. It is hopeless to expect padi to grow under such conditions, and the consequence is that a stretch of about 5,000 acres, which should be yielding a million and a half *gantangs* of padi every year, is lying waste and producing nothing.

What makes the present position all the more unsatisfactory is the fact that the demand for padi land in Krian is far in excess of the supply. There are large numbers of people who would be willing to take up land of this description, and, indeed, the least promise of better conditions is sufficient to start the Malays applying for allotments. A single successful harvest from the experimental fields near Bagan Serai caused a rush of applicants for land in the neighbourhood, and in a few weeks about 2,000 acres were alienated. It is certain that when the irrigation conditions have been set right a couple of years will see every acre of these abandoned areas under padi.

Water Control in Other Areas.

The injurious effects of deep flooding are seen at their worst on poor land, where the seedlings, being always below the average height, are more liable to be submerged, and also in low places from which it is difficult to remove water. But where neither of these conditions obtains, a certain amount of care is often necessary to prevent damage; and as the possibility of danger was never previously realised, it is safe to assume that losses must have occurred on areas of good land provided with all needful facilities for drainage.

It is not necessary to go further back than last year to find a case of this kind. From the part of the *mukim* of Gunong Semanggol, covering about 5,000 acres, which is in regular cultivation, the crop in 1912 averaged 234 *gantangs* an acre: in 1913 there was a drop to 103 *gantangs*. Enquiries show beyond doubt that the decrease was due to deep flooding, which was thus responsible for a loss of three quarters of a million *gantangs* of padi.

What happened in this case over a comparatively small acreage might easily occur on a much more extensive scale, either as

the result of the injudicious use of irrigation water, or from the coincidence of a period of heavy rain with the planting season.

The first of these causes probably accounted for the poor harvest obtained in Krian in the year 1912, when, according to official figures, the average yield dropped from 313 to 209 *gantangs* an acre, and the total crop fell short of the previous year's standard by nearly five million *gantangs*.

The weather conditions during the planting season just over were ideal for the operation of the second cause, and but for the fact that the disastrous effects of deep flooding had been brought to light, scarcely any part of Krian would have yielded a full crop at the next harvest. As it was, unremitting effort was necessary on the part of the irrigation officials, and even then padi was damaged in a few places.

It is thus concluded that the same cause which has kept large tracts of land in Krian lying idle, accounts also, in all probability, for the poor harvests over the whole of the irrigated area in so-called bad years. Now that the cause is known it will be easy to suggest remedies, which can be applied at a comparatively small cost. For the most part all that is necessary is care and adequate supervision, but money will have to be spent in making and enlarging drains and watergates, and in building banks to separate areas of different elevations. Owners of poor land will be required to help a little by tilling and manuring the sites of their nurseries so as to raise seedlings of a taller growth.

Effect of Improved Irrigation on Total Crop.

When the simple measures suggested above are effected every acre of irrigated land in Krian will come into cultivation, and it will be possible in every part to obtain the maximum crop which the land is capable of yielding. A few figures will show the magnitude of the increase which may be expected.

Out of a total of 70,000 acres of irrigable land, 50,000 acres were planted last year. The area under cultivation can therefore be enlarged by 20,000 acres.

Then as regards the possible crop. While there are many thousands of acres which will yield between 500 and 750 *gantangs* of padi an acre, there is comparatively little land which will produce less than 300 if it is properly irrigated. It is estimating very moderately, therefore, to say that the crop for the whole district could be raised from 278 *gantangs* an acre, the average for the past three years, to a steady average of 350 *gantangs* an acre. At this rate of production, over the enlarged area which will soon be under padi, the total crop from Krian would amount to 24½ million *gantangs*. This is more than twice the amount obtained in 1912, namely 11¼ million

gantangs, and nearly 80 % in excess of the average crop for the last three years, namely 13¾ million *gantangs*.

This increase is truly enormous when it is considered how simple and inexpensive are the means by which it can be brought about. Not the least satisfactory feature of the case is that the necessary measures are such as can be carried out by Government, and that the achievement of the result does not depend on the exertions of the Malays.

Soil Improvement.

All the land within the irrigated area in Krian is sufficiently fertile to ensure a living to its occupiers. But in the case of land yielding between 200 and 300 *gantangs* an acre the margin of profit is very slender, and efforts are being made to find a cheap method of improving the soil. The experiments have been described in a previous number of the *Agricultural Bulletin*. They are of two kinds, designed to test respectively the effect of cultivation and of manures. A full account of the results would be too long for publication in this article, and it will be sufficient to mention their salient features.

It has been found that shallow cultivation, either with the *changkol* or with the plough, has very little effect in the first year, but when repeated for two years it increases the crop by nearly 50 %. Cultivation, therefore, is strongly to be recommended. The great difficulty is that the owners of this land are all too poor to buy ploughs and cattle. A method of inducing them to cultivate with the *changkol* which promises success is, however, described below.

The application of artifical manures has an immediate effect, but in no case was the value of the extra padi obtained equal to the cost of the fertilisers. There are, however, other manures in plenty which are obtainable at the expense of a little labour, and it is proposed to encourage the use of these. Indeed, it would be unwise to introduce the use of fertilisers into the district until the Malay has been taught to make the fullest possible use of the materials at his disposal.

The chief of these are weeds, padi straw and chaff, and farmyard manure. Immense quantities are now wasted yearly, because the Malays, with very few exceptions, are ignorant of their value. If this waste were prevented, as most of it easily could be, it would go far to check the impoverishment of the soil by the continuous raising of crops; and the plentiful use of the substances mentioned on the poorer land would result in a considerable increase in fertility.

Vegetable-Growing on Padi Land.

Experiments intended to teach the Malays how to utilise their land between the padi seasons were started immediately after the harvest last February. What was wanted was a crop which would

ripen in four months or less, would grow in any kind of soil, and would command a ready sale locally. The vegetables grown by Chinese market-gardeners were found to offer a fair choice, and the most suitable seemed to be the sweet potato (*ubi kalêdek*). It is a crop to which the Malays are quite unaccustomed, but they did not take unkindly to the idea, and plots, each about a quarter of an acre in size, were planted in ten different fields. Most of the men did the necessary work themselves, but a few of them hired Tamils to prepare the plots.

The crop, in point of profitableness, far exceeded expectations. In no case was the return less than $35 an acre, and on better soil it was as much as $50. How this compares with the return from padi may be judged by the following figures, which give two examples where the preparation of the vegetable plots was done by Tamils. It will be seen that on the poor land it is scarcely possible to make a profit from padi unless the owner of the field does practically all the work himself. The figures for the two crops are strictly comparable; in neither case do they include the cost of weeding or harvesting.

SWEET POTATOES.

Place.	Yield in pikuls.	Cost per acre.	Return.	Profit per acre.
Simpang Tiga	42	$14.11	$35.28	$21.17
Siakap	56	$18.75	$44.80	$26.05

PADI.

Place.	Yield in *gantangs*.	Cost per acre.	Return.	Profit per acre.
Simpang Tiga	200	$15.00	$16 00	$ 1 00
Siakap	350	$15.00	$28.00	$13.00

Mention was made above of the fact that the poverty of the owners of inferior padi land prevents them from buying ploughs and cattle with which to cultivate their fields. The profits to be made by vegetable-growing should supply the needful incentive to cultivate by more laborious means. As the necessary tillage is very thorough it would have an excellent effect on the soil, and, later, on the yield of padi. Moreover, the residue of the crop is all buried, and would serve as a green manure. Another point which should appeal to the Malays is that after the crop is lifted the land is left clean ready to be planted up with padi, and there would thus be a saving of many dollars an acre, or of the hardest work of the whole year. A potential advantage is that, according to authorities in the Philippines, locusts have little liking for the leaves of the sweet potato.

The benefits are so manifold that it should be an easy matter to induce the Malays to take up the cultivation. There is a big and steady demand for sweet potatoes, which is now supplied entirely by

Chinese who are allowed to cultivate between the rows of young rubber on estates in Krian and the Province. As the trees grow in size these men are being turned out, and it is difficult to see where they will get more land. The present, therefore, is an exceedingly favourable time for the Malays to get into the market.

NOTES ON TAPPING EXPERIMENT AT GUNONG ANGSI.

Second Year Result.

By F. G. Spring.

An account of this experiment was published in the *Agricultural Bulletin*, Vol. 1, page 154, and the results for the first year then given. It may be remembered that for the purpose of comparison the experiments in fields 1 and 3 are the same. This serves a double purpose. In the first place it shows the differences in yields of rubber obtained with similar systems of tapping at different elevations and secondly, the differences in yields of rubber obtained with varying systems of tapping at the same elevation. The labour employed is Tamil, one coolie being in charge of one experiment in one clearing, namely 80 trees. The gouge knife was used throughout.

It will be seen that in experiments 1 and 3 where tapping is conducted every day, the whole circumference of bark is completely tapped in 2 years while in experiments 2 and 4 alternate-day tapping, the time allowed for bark renewal is 4 years.

The following is the results of total rubber obtained for the first year tapping. For monthly yields, see *Agri. Bull.*, Vol. 1, page 154.

		Expt. 1.		Expt. 2.		Expt. 3		Expt. 4.		
	Elevation.	Total Rubber.		Total Rubber.		Total Rubber.		Total Rubber.		Grand Total.
		lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs. ozs.
1st Clearing	300 ft.	555	11	303	13	441	14	237	4	1,538 10
3rd Clearing	1,000 ft.	388	14	207	12	308	15	195	6	1,100 15

In the first year tapping, both at the first and third clearings, the adjacent quarters (double V) gave a considerably larger yield of total rubber than opposite quarters. During the period referred to above, the total excess of rubber from adjacent quarters compared with opposite, in fields (1) and (3) where two years are allowed for bark renewal, experiments 1 and 3, was approximately 25 per cent. while in the plots where the period of renewal is 4 years, experiments 2 and 4, the excess was approximately 17 per cent.

During the second year, in the first clearing, the yields of total rubber in adjacent quarters exceed that of opposite quarters, particularly where the period of bark renewal is 4 years, the difference being 120 lbs., in the plots where two years are allowed the excess in favour of adjacent quarters is 11 lbs., but an allowance of 25 lbs. of rubber has to be added for trees destroyed by wind in the latter part of the first year tapping, the total excess, therefore, is not 11 lbs. but 36 lbs. These differences are considerable when it is remembered that the number of trees in each plot is 80.

In the third clearing unfortunately a number of trees in adjacent quarters were destroyed by white ants, deer, and heavy gales. The trees lost in this clearing are as follows :—

Experiment 1 three trees, Experiment 2 six trees. Making allowance for these trees the excess of total rubber in adjacent quarters over opposite, 4 year bark renewal, is 15 lbs. but in the case of 2 year renewal there is a loss of 33 lbs.

Both at the first and third clearings it is seen that the excess of total rubber in adjacent quarters is most evident in the plots where the bark renewal period is 4 years. Apart from adjacent quarters giving more total rubber than opposite both at Gunong Angsi and Kuala Lumpur Experimental Plantations, the first mentioned is a very much cheaper system to adopt as regards cost of tapping, latex cups and the clearing of same, holders, spouts, collecting latex, and the marking out of the guiding lines.

The next point of interest is a comparison of the same system of tapping where 2 and 4 years are the periods of bark renewal. These comparisons are given underneath.

Double V, Bark Renewal,	2 years,	1st clearing.	683 lbs.	12	ozs.
„ V, „	4 „	1st „	598 „	8	„
		difference	85 „	4	„
„ V, „	2 „	3rd „	435 „	11½	„
„ V, „	4 „	3rd „	315 „	5½	„
		difference	120 „	6¼	„
Opposite Quarters	2 „	1st „	672 „	1¾	„
„ „	4 „	1st „	478 „	11¼	„
		difference	193 „	6½	„
„ „	2 „	3rd „	480 „	11½	„
„ „	4 „	3rd „	324 „	15½	„
		difference	155 „	11½	„

At the close of the second year tapping, experiments 1 and 3, both at the 1st and 3rd clearings, the whole circumference of bark has been completely removed in 2 years and it is now necessary to tap on two year renewal of bark or commence top tapping, both of which are most unsatisfactory, the first as regards thinness of bark and the second as regards yield of rubber, the alternative being to

rest the trees. Compare this with experiments 2 and 4. At the close of the 2nd year only half the circumference of bark has been removed and there remains untapped bark for the 3rd and 4th year. In the first few months of tapping in 1911 the quantity of latex obtained has been directly dependent on the amount of bark removed but at the end of one year the difference is not so great, while during the second year the differences are comparatively low and by no means in proportion to the amount of bark removed. In the 3rd and 4th year the yield of latex in experiments 2 and 4 (four year bark renewal) will in all probability exceed that in which the bark is removed at double the rate on account of top tapping which is to be conducted It is fairly clear that to remove the whole circumference in two years is expensive as regards labour and unsatisfactory in yield of rubber.

The next point of interest is the yield of total rubber, with similar systems of tapping but at different elevations. These results for the second year are as follows.

	Elevation.	Expt. 1. T. Rubber.		Expt. 2. T. Rubber.		Expt. 3. T. Rubber.		Expt. 4. T. Rubber.		Grand Total.	
		lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.
1st Clearing	300 ft.	683	12	598	8	672	1¾	478	11¼	2,433	1
3rd Clearing	1,000 ft.	435	11½	315	5¼	480	11½	324	11¼	1,556	7½

It should be noted here that in the previous article the distance of planting was given as 20×20 ft. This is not the distance of planting in the first and third clearings. The distance of planting in clearing number three is 15×15 ft. and in number one 25×23 ft. This factor has to be considered along with elevation as regards yield of rubber at different elevations with similar systems of tapping but does not affect the individual experiments at the same elevation.

The increases in average girth measurements at an elevation of 300 ft. are 8·0, 9·3. 9·7, and 8·7 inches or an average of 8.9 inches, while the increases at an elevation of 1,000 ft. are 7·38. 8·4, 6·0, and 7·2 or an average of 7·2 inches.

These figures also show that in the case of adjacent quarters the excess of average girth increase over opposite quarters is considerable where the period of bark renewal is 4 years, this is consistent with the higher yield of total rubber in adjacent quarters over opposite where 4 years are allowed for bark renewal.

The following is a list of the experiments.

EXPERIMENT 1.

System of tapping—Double V, cuts 18 inches apart.
Twenty cuts to the inch. Every day tapping.
Time allowed for bark renewal, 2 years.

No. of trees 1st clearing 80, average girth in 1911, 26·3 inches, elevation 300 ft.
„ Oct., 1913, 34·3 inches.
No of trees 3rd clearing 80, „ in 1911, 21·12 inches, elevation 1,000 ft.
„ Oct., 1913, 28·5 inches.

EXPERIMENT 2.

System of tapping—Double V, cuts 18 inches apart.
Twenty cuts to the inch. Alternate day tapping.
Time allowed for bark renewal, 4 years.

No. of trees 1st clearing 80, average girth in 1911, 25·6 inches, elevation 300 ft.
„ Oct., 1913, 34·9 inches.
No. of trees 3rd clearing 80, „ in 1911, 21·4 inches, elevation 1,000 ft.
„ Oct., 1913, 29·8 inches.

EXPERIMENT 3.

System of tapping—Opposite quarters. Two cuts 18 inches apart on each quarter.
Twenty cuts to the inch. Every day tapping.
Time allowed for bark renewal, 2 years.

No. of trees 1st clearing 80, average girth in 1911, 25·1 inches, elevation 300 ft.
„ Oct, 1913, 34·87 inches.
No. of trees 3rd clearing 80, „ in 1911, 21·9 inches, elevation 1,000 ft.
„ Oct., 1913, 27·90 inches.

EXPERIMENT 4.

System of tapping—Opposite quarters. Two cuts 18 inches apart on each quarter
Twenty cuts to the inch. Alternate day tapping.
Time allowed for bark renewal, 4 years.

No. of trees 1st clearing 80, average girth in 1911, 25·8 inches, elevation 300 ft.
„ Oct., 1913, 34·5 inches.
No. of trees 3rd clearing 80, „ in 1911, 21·7 inches, elevation 1,000 ft.
„ Oct., 1913, 28·9 inches.

Second Year Result.

EXPERIMENT 1

Latex Rubber				
Month	1st Clearing		3rd Clearing	
	lbs.	ozs.	lbs.	ozs
27-31 August, 1912	4	3½	3	3½
September ,,	39	9	38	10½
October ,,	31	7¾	29	3
November ,,	39	2½	25	3¾
December ,,	45	8¾	40	2¾
January, 1913	59	13	35	8
February ,,	46	13	23	7¾
March ,,	55	1¼	30	7
April ,,	51	3	23	4½
May ,,	59	11¼	33	5
June ,,	63	5½	26	9
July ,,	58	14¼	38	3
1-26 August ,,	51	3½	27	3½
Total	606	0	374	6¾
Total Scrap and Bark Shavings	77	12	61	4¾
Total Rubber	683	12	435	11½

EXPERIMENT 2

Latex Rubber				
Month	1st Clearing		3rd Clearing	
	lbs.	ozs.	lbs.	ozs.
27-31 August, 1912	7	0	2	7½
September ,,	36	13¼	21	3¼
October ,,	38	12	25	9¼
November ,,	27	1¾	17	2¼
December ,,	44	3½	29	2¼
January, 1913	45	9½	26	5¼
February ,,	37	5½	23	3
March ,,	41	0½	24	12¾
April ,,	49	8¼	20	8¼
May ,,	53	12	15	9½
June ,,	59	14	17	15¾
July ,,	56	7½	23	10½
1-26 August ,,	45	5¼	23	6½
Total	542	12½	271	0
Total Scrap and Bark Shavings	55	11¾	44	5¼
Total Rubber	598	8	315	5¼

Second Year Result.

EXPERIMENT 3

Latex Rubber				
Month	1st Clearing		3rd Clearing	
	lbs.	ozs.	lbs.	ozs.
27-31 August, 1912	2	0¾	4	15¾
September ,,	32	6	32	6¼
October ,,	39	0	29	14¼
November ,,	33	4¼	28	1½
December ,,	53	6¼	38	9½
January, 1913	63	9¾	37	4¾
February ,,	52	9½	36	1¼
March ,,	48	7½	39	14¾
April ,,	51	9	33	6¾
May ,,	57	5¾	38	1¼
June ,,	56	15¼	32	12¼
July ,,	55	0¾	37	0
1-26 August ,,	45	2¼	27	8¼
Total	590	13	416	0½
Total Scrap and Bark Shavings	81	4¾	64	11
Total Rubber	672	1¾	480	11½

EXPERIMENT 4

Latex Rubber				
Month	1st Clearing		3rd Clearing	
	lbs.	ozs.	lbs.	ozs.
27-31 August, 1912	3	12	4	5½
September ,,	29	5½	23	4½
October ,,	32	2¾	28	10½
November ,,	24	3	20	6
December ,,	42	3¾	31	14¼
January, 1913	51	3¾	23	12¾
February ,,	30	8¼	24	5
March ,,	31	7½	27	4½
April ,,	32	2½	26	2
May ,,	36	15¼	18	0¾
June ,,	29	8½	15	9½
July ,,	42	1¼	22	13½
1-26 August ,,	32	6¼	16	2
Total	418	0	282	10½
Total Scrap and Bark Shavings.	60	11¼	42	4¾
Total Rubber	478	11¼	324	15¼

LOCUST WORK IN SELANGOR.

By F. de la Mare Norris.

Progress Report For October.

Throughout the month of October locusts in the hopping stage were still numerous in Selangor, and their destruction was supervised by the Special Assistants in their respective districts.

In the neighbourhood of Kajang the swarms were comparatively small and scattered, and by October 20th, the district was practically free from hoppers, and it seemed advisable for the officer in charge of the work to return to his own State, Negri Sembilan, as his services were urgently required there. During the month approximately 465 tins of locusts, representing about 110 swarms, were destroyed in the district. The swarms around Kuala Lumpur were, on the contrary, large and the apparatus available was barely sufficient to cope with them. Moreover, they did not confine their attention to waste land or lalang, but did a considerable amount of temporary damage to gardens and hedges, and the scarcity of apparatus made it quite impossible either to deal with some of the smaller swarms or to distribute any sheeting to protect gardens and tennis lawns from their ravages. The chief centres of work were the Circular and Ampang roads and the Petaling district, and in both of these localities two gangs of coolies were employed. By October 28th there were few hoppers in the vicinity, and no further destruction was possible. The catch for the month was 1,820 tins, representing 83 swarms in all. In the Ulu Selangor district, swarms were large and in situations where they were difficult to deal with, but the results were most satisfactory and the locusts in this neighbourhood have received a check which cannot have failed materially to decrease the possibility of their threatened advance into Perak. The chief centres of work were Rasa, Batang Kali, Bukit Chondong, the Kuala Selangor road, and Serendah. By the end of the month the work was finished. The catch was 3,030 tins, 50 swarms being accounted for. In addition to the work done by the Special Assistant and the Government coolies the Malays caught approximately 12,000 tins of hoppers for the reward of 50 cts. per tin, in this district.

Summary Of Work For Period August 6th To October 31st And Present Position.

The period from August 6th to October 31st may conveniently be termed the "hopper season" in Selangor and fortunately it corresponded approximately with the occurrence of flying swarms in Negri Sembilan. This made it possible to concentrate the majority

of the apparatus in Selangor and to obtain the services of one of the Special Assistants from that State. At the commencement of the period apparatus was scarce and this has been a handicap throughout, though towards the end of the season the position has greatly improved.

With the termination of the hopper season, it would appear to the casual observer, that work has ceased; but in reality this is not the case, and the present time is by no means a period of rest for those in charge of the work. The coolie gangs have been dispensed with, but the officers and conductors have all their time fully taken up. One Special Assistant has been lent to Negri Sembilan, and is helping to cope with the hoppers there; the other officer is now busy preparing for the next season. Conductors have been posted in every district with instructions to locate and trace the movements of the flying swarms throughout the State, with the result that we are now acquainted with the positions of forty-four swarms. Of these only six are large; fifteen are medium and twenty-three quite small. The largest swarm is at present in the neighbourhood of Ulu Klang and probably consists of the locusts that escaped from the Ampang and Setapak districts. Many of these swarms are fairly stationary, nearly all the moving ones are travelling in an easterly direction, some having gone far into the jungle.

The locating of these swarms is of the greatest importance to the successful working of the scheme, and our position at present is undoubtedly far more favourable than it was at the commencement of the last hopper season, as there will be now no need to wait for reports of breeding grounds and hoppers. By watching the movements of the swarms we shall at once know when they are about to breed, and it will be possible to prevent many of them from ever giving rise to another generation. The difficulty with regard to apparatus has been overcome, a large consignment having recently arrived in the country.

Appended is a summary of results obtained during the hopper season in Selangor.

Summary of results in Selangor for the period August 6th to October 31st.

District.	Locusts caught by	Kerosene Tins.	Swarms.
Ulu Selangor	Special Assistant and Government Coolies.	4,347	72
do.	Malays, for 50 cents per tin.	14,100	28 (estimated)
Kuala Lumpur	Special Assistant and Government coolies.	5,768	149
Ulu Langat	Special Assistant and Government coolies.	538	143
	Total	24,753	392

ROTAN SEGA.

By L. C. Brown.

The Rotan or "Rotan Sega" is a valuable forest vine, indigenous to the Federated Malay States and is to be found growing in most districts.

The purpose for which it is mainly used is for the best fine rotan work, cane chairs, basket ware, etc., and on this account is always in very good demand while commanding the highest price of any rotan on the market.

It is essentially a forest vine, and in Malaya there are attached to many estates considerable forest reserves which at present serve no useful purpose, and in many cases there appears but little prospect of this "waste land" augmenting to any considerable extent the value of the cultivated part. Under these circumstances it seems that this class of land is suitable for growing such a product as the above Rotan and might be utilized for this purpose.

Many enquiries addressed to this office relating to the cultivation of this vine induced me, while on a recent tour of inspection on the Pahang River, to examine and enquire into the methods used in its "cultivation," and the possibility of its being of value to Europeans who might have land available.

As might be expected from the customary habit of the Malay to do all work with the least possible labour and with singular disregard of the ultimate results of his exertions, his system of "cultivating" this vine is very primitive. After the land has been acquired by the Malay the only preparation for planting made is to clear the undergrowth in the immediate vicinity of those trees at the base of which it is intended the vine should be planted. These trees are selected and range from 15-20 feet apart. For planting, two methods are used.

First :—Seed at stake. *Secondly :*—Young plants from a nursery. In both cases they are planted quite close to the trunk of the selected trees in order that the young shoots can immediately attach themselves to the trees. Of the two methods the latter is the more usual one adopted by the Malay. The seed is plentiful and easily procured. For transplanting, which appears to be the better way, a nursery is prepared and the seed sown in it. When of sufficient size the young vines are planted in the way already described and no further attention devoted to them until some of the vines are ready to collect. One plant, I understand, will produce 50 or more shoots which ultimately form the canes, each of which often obtains the length of 100 feet.

At first the Rotan is covered with sharp pointed thorns, but as the vine matures these, together with the outer covering, are shed and when ready to be cut there remains only a smooth surface.

There is a slight difference of opinion on the length of time it takes from the planting of the seed to the time the vine is mature, but from the enquiries made it would seem that a few are ready to cut after 6 years, and in each succeeding year a few more until an average yield may be expected. The vines, however, are not necessarily cut every year, for in one of the "plantations" I visited the owner said he collected them once in two years and to do this it was necessary to make rentices through the dense undergrowth which had sprung up in the time intervening between each gathering of the crop. When allowed to grow wild for two years it is not possible without these rentices to obtain the vines, or to haul the product from the forest.

It will be seen that the Malays take practically no trouble in the cultivation of the product in question, and I feel sure that under more favourable conditions the plants might be made to yield a great deal better than is at present the case and at no great expense. For instance, with more light thrown upon the vines they would probably mature at a much earlier age. With the Malay method of growing this vine the plants when young are overgrown with heavy undergrowth, and it would require but small attention to remedy this, thus improving the prospect of the vines making better progress, and ultimately giving a better result.

With very little care and small expenditure, the systematic cultivation of this product would possibly prove a good agricultural investment and is certainly worth a trial by Europeans.

MESUA FERREA, CEYLON IRON WOOD, AS A POSSIBLE SUBSTITUTE FOR LIGNUM VITAE IN TIN MINING MACHINERY.

It has been suggested that this timber might replace Lignum Vitae in tin-mining machinery, and to test this theory, Mr. Smith of Tekka Mines, near Taiping, kindly conducted experiments. The timber supplied was that from a tree grown in the Residency grounds, Taiping, which, owing to its close proximity with another of the same species, was cut down in March of this year and stored in a dry shed till July, when the bole and larger branches were handed over for experiments. The size of the bole in circumference, at three feet above ground, was forty seven inches and the age about twenty years.

The following report tends to show that timber from a tree at twenty years old, cannot replace "Lignum-Vitae."

Tekka Mines, Taiping.
October 24th, 1913.

RE IRON WOOD OF CEYLON.

We received a quantity of this timber for experimental purposes as a possible substitute for "Lignum Vitae," a wood largely used in machinery owing to its excellent properties under stress and friction, also its natural self-lubrication when used in bearings which work under water, and which are always difficult to lubricate by outside means.

After trial we have found that Iron wood *does not* contain this most valuable property of self-lubrication, therefore making it unsuitable for bearings or moving parts under friction, its degree of hardness also does not compare favourably with "Lignum Vitae" not being so close grained.

Iron wood would probably be quite suitable for purposes of construction work where submerged, as it is impervious to water, and would make excellent piling.

It was found a difficult timber to work due to cracking and splitting, radial from the heart of bole. This was at first thought to be due to its not being seasoned, a portion of the bole was afterwards stored in a dry place for three months with the same results, it being found impossible to obtain a good section free from cracks when cut.

As a result of the trial we gave this wood. it will be seen that we cannot hold any high opinion of its especial use for the demands of Engineering work.

SD: E. H. SMITH,
Engineer.

The genus Mesua (N. O. Guttiferae) comprises about half a dozen species of ornamental trees and shrubs, natives of Tropical Asia, of which *M. ferrea* is the most useful and most ornamental. It is known in the vernacular as Penaga Kunyit, also Penaga lilin, Penaga puteh, or Penaga suga, and in Tamil as Naka or Nangul. The generic name Mesua, is derived from that of two celebrated Arabian physicians and Botanists, "Mesue," who flourished at Damascus in the eight and ninth centuries. The species *ferrea* is a slow growing moderate sized tree about forty feet high, broadly conical, densely branched, the lower branches almost touching the ground, native of Southern India, Ceylon and Malaya. Heartwood dark red and extremely hard, medullary rays very fine. The young leaves which appear twice yearly, are at first brilliant red, then pink, gradually passing to dark green of the adult stage. Mature leaves, from two to six inches long, deep green and shining on the upper surface, underside

covered with a greyish white powder, lancolate or lanceshaped and coriaceous or leathery. Its flowers, very like the English dog rose, are white, very fragrant, three to four inches in diameter, solitary. Stamens deep yellow, contrasting extremely well with the white corolla. Fruits pointed, two-valved, supported by the persistent scaly sepals, containing one to four hard-skinned shining seeds, yielding oil.

As an ornamental tree both for its beautiful flowers and foliage, it is difficult to find a more handsome one, its perfect shape and habit make it an excellent subject for planting as a specimen tree on lawns or at the entrance of carriage drives.

W. L. Wood.

Superintendent, Hill Gardens, Perak.

REVIEWS.

The preparation of Plantation Para Rubber by S. Morgan:—

This book, written by the Local Research Chemist of the R. G. A., is certainly one of the best books on rubber published during recent years. The title sufficiently indicates the contents, although the author is dealing entirely with plantation "Para" rubber which, at any rate, constitutes by far the greater proportion of plantation rubber.

Chapter I contains a brief discussion on planting and methods of thinning out and does not contain any new information.

The second chapter deals with the vexed question of tapping systems and consists to a great extent of remarks and criticism on the various systems in vogue, in addition to which interesting tapping experiments carried out by the author are given. These experiments lead to the same conclusions as were derived from somewhat similar experiments carried out during the last 3 or 4 years at the Agricultural Department viz., that excessive tapping reduces both the volume of latex and the rubber content of the latex and that, per tapping, an alternate day method yields more rubber. This would also mean a reduction in the cost of tapping. Too many questions are involved to enable one to recommend alternate day tapping definitely. Incidentally, it may be mentioned that the vulcanisation tests carried out on samples obtained in these tapping experiments, appear to have indicated for the first time the superiority of smoked sheet.

In connection with the carrying out of tapping experiments it would appear that much time has been wasted in the past, even by scientific workers, by unfortunate selection of trees, or by carrying out experiments on too small a scale, or without adequate controls, so that the deductions to be drawn from these expreiments lose much of their value. Again, one is afraid to place too much reliance on many of the results obtained especially in tapping experiments, unless one knows that the experiments have been personally supervised by the experimenter from beginning to end, as I have found myself the most extraordinary measurements made by native assistants even after considerable training.

Another point which is often lost sight of, even by the scientifically trained agriculturist, although this should not be so, is the percentage error involved. So many factors are concerned in agricultural operations, that unless one knows the limits of error or variability in an experiment, the result may be valueless. As an illustration, in connection with manurial experiments, it may be found that by the application of a certain fertilizer to a crop, an increase of 10 per cent in the yield is obtained. The next question to be considered, is whether this difference of 10 per cent, or any part of it, is merely a natural variability due to a number of factors, or is caused by the application of the fertilizer. This can only be ascertained by experimenting in a similar manner on a number of plots suitably chosen, and carrying on the experiment for a prolonged period or for several successive crops. In this way only can the natural variation or error be ascertained. Another fault often observed, is that experimenters, even those again who ought to know better, vary more than one factor at a time in an experiment.

These facts need special emphasis in connection with tapping experiments, as it is well known that individual trees vary considerably in yield of both latex and dry rubber.

The criticisms which the author of the book under review finds it necessary to give in this section, fully bear out the remarks expressed above. By this time we ought to be in possession of reliable statistics and information as to the best methods of tapping to adopt, always bearing in mind the financial considerations involved.

I have dilated somewhat lengthily on this chapter, because these points cannot be too strongly emphasised and feel that much valuable time has been wasted in the past.

The next section on "Tapping and collecting" deals in a very comprehensive manner with the question of tapping instruments, and collecting cups and contains valuable hints on a number of points, which should be, but are often not realised by the planter. Incidentally the author, while deprecating top tapping for several

reasons, which are well known, states that vulcanising tests have not shown any inferiority in the rubber obtained, from ordinary top tapping, at about 9 or 10 feet, to that obtained from normal tapping nearer the base, although the rubber obtained from the leaves of the tree, as can be seen in the case of the raw material, is inferior.

In the next section dealing with the transport of latex, it is interesting to note that formalin has no deleterious action on rubber, and this substance should find increasing use for the prevention of natural coagulation in the field and the prevention or diminution of the various chromogenic micro-organisms which attack the freshly prepared raw rubber, as experiments carried out in the Agricultural Department show that rubber prepared from latex to which formalin has been added, is not so liable to develop fungoid growths, during the initial stages of drying, when most of the damage takes place. The use of Sodium sulphite as an anti-coagulant, which has been recommended by Mr. Barrowcliff of the Agricultural Department, is also recommended in this section and shown to have no deleterious effect on the rubber produced.

Under "General field operations" valuable suggestions are again given in connection with small but important details of procedure.

Part II of the book deals with factory operations and deals thoroughly with practically all the problems met with in the factory, such as dilution of latex, coagulant, dilution of coagulant, bulking of latex, straining, addition of acid, oxidation of rubber causing darkening, the use of sodium bisulphite to inhibit oxidation, use of formalin etc. Chapter VIII treats of the preparation of sheet rubber and enumerates the various defects observed, gives remedies for these or means of obviating them. Chapter IX discusses Crepe rubber in a similar fashion and the various methods adopted to procure light colour by destroying the oxidising enzymes.

In this section it is pleasing to note the author's recommendation of a washing machine on the Werner-Pfliederer Universal Washer system, since this confirms the reviewer's conclusions in a recent report, derived from inspections of factories in Europe and methods of washing adopted therein for low grade rubbers.

Systems and methods of drying are fully discussed in the next section. Smoking is also discussed under this section.

The value of the information given, consists in the fact that all the conclusions arrived at are supported by vulcanising tests and these conclusions agree with opinions expressed by the reviewer, which had not the moral support of such tests. The vulcanising tests also appear to support the conclusions deduced from viscosity

tests on raw rubber and indicate that this test, under proper control, may be a valuable one for a particular species of rubber such as Hevea. It is a pity, I think, that no viscosity experiments are given in the book, as it would have been interesting to compare the results obtained with the mechanical tests carried out on the same samples after vulcanisation.

Part III deals with machinery and buildings and the same amount of common sense and appreciation of various factors which are often overlooked, is brought to bear on the numerous problems which present themselves in this connection, as in the other details of manufacture mentioned previously.

One interesting observation, which has never come under the writer's notice, is the actual occurrence of small particles of brass etc. in the rubber from the bearings of a machine. The author confirms the remarks previously given elsewhere as to the danger of using copper rollers, due to the formation of copper salts and their injurious action on rubber. The various minor though important defects in certain machines, sometimes common to all, are also pointed out in this section.

Chapters XIV and XV deal in greater detail with the defects of crepe, block and sheet rubber and discusses remedies and prophylactic measures.

Interesting tests shewing the comparative strengths of different samples are given in the next section and the advantages of preparing smoked sheet compared with crepe are enumerated in a very lucid manner, and expressed, in what should be to planters or owners the most interesting mathematical method—dollars, or pounds, shillings and pence.

A section devoted to a discussion of the respective merits of Plantation and Fine Hard Para is also of interest, especially since the statements made and conclusions arrived at are supported in every instance by mechanical tests carried out on vulcanised specimens, which must be the only criterion.

It will be very satisfactory if, with the plant at the Agricultural Department we shall be able to verify all the results arrived at.

In the subsequent section on "Choice of Coagulant" the author supports the results obtained by the reviewer in contradiction to those arrived at by Parkin in Ceylon.

Although it is shewn in this section that other mineral and organic acids are equally effective as Acetic acid as a coagulant, their use is not recommended at present, for various reasons which are discussed, and the use of acetic acid is recommended.

The fallacy of the arguments of those who abuse plantation rubber on account of the fact that "chemicals" viz. Acetic acid

are used in its preparation, are pointed out in the succeeding section, where it is shewn, as would be expected, that the residual acidity of plantation rubber is considerably lower than that of Fine Hard Para, in which the acid is a natural constituent of the fumes produced by the slow combustion of the fuel used. Interesting suggestions are also made re grading, and general information given on the subject of spraying mixture for various fungoid and insect pests.

The final chapter contains general information on cultivation of soils and as it contains nothing new, calls for no remarks.

The only real criticism which can be given, is that possibly the book might have been somewhat more condensed, as the information is redundant in parts—due principally to the method of division adopted. This redundancy however serves to emphasise various points. The marginal remarks are of considerable value in enabling one to refer easily to any particular point.

The book is eminently practical and should be in the hands of every planter—manager or assistant, and I might suggest in addition—factory engineers and designers of rubber factories.

Rubber and Rubber Planting by R. H. Lock:—

This book has been written recently by Dr. Lock formerly Assistant Director, Royal Botanic Gardens, Ceylon.

I regret that such favourable remarks cannot be applied to this volume as to the book reviewed above. One would have anticipated quite a different book from the hands of an authority such as Dr. Lock.

As it stands, no doubt the book may be of value to some readers, but this will be the reader at home, who has never seen a rubber tree, and certainly not the practical planter, for the book contains none of these valuable suggestions on the numerous problems which confront both the planter and the scientific adviser, which are contained in the publication reviewed above.

After such books as "Hevea brasiliensis or Para Rubber" by Herbert Wright, "Rubber" by Schridowitz and the small volume "Rubber" by Clayton Beadle and Stevens, the present publication is unnecessary, as it contains nothing that is new. The illustrations are by no means well chosen, the only washing machine given being a hand machine, while in connection with the problem of drying it would have been much more interesting to have given a drawing or photograph of a drying or smoke room than of a vacuum drier, since the latter method of drying is much less common.

On the problem of preparing a light coloured crepe rubber, Dr. Lock mentions only the method of immersion in water at 80° C., and does not refer at all to the most recent and satisfactory method

of using Sodium bisulphite. The book is probably intended for the home reader and cannot be recommended to planters, as the books quoted above are much more suitable.

B. J. E.

THE HOUSE-FLY AS A DANGER TO HEALTH.

Under the above heading Mr. E. E. Austen publishes in the Economic Series of the British Museum a most interesting paper, and the information contained in it will be of value to residents of this country. With the exception of the description of the house-fly (Musca domestica) most of this paper is quoted.

As a general rule accumulations of fermenting horse-manure form the chief breeding-places of the house-fly, but although this insect lays its eggs by preference in horse-manure, it will also breed in other excrementitious substances, and in decaying and fermenting organic matter of various kinds, such as is often present in ashpits and larger deposits of house-refuse. The dull, chalky-white eggs are about $\frac{1}{25}$th to $\frac{1}{20}$th of an inch in length, and are laid in small masses generally in crevices in the material that is to supply the maggots (or larvae) with food. A single female house-fly lays from 120 to 150 eggs at one time, and may deposit five or six such batches of eggs during its life. The rate of development varies greatly, depending upon several factors such as the temperature of the food-material and of the air, and the character of the food. In the British Islands, however, it has been found that in very hot weather the progeny of a house-fly may be laying eggs about three weeks after the eggs from which they themselves developed were deposited. The eggs hatch into white, footless maggots which when full-grown are a little under half an inch in length; the chrysalis or pupal stage is passed within a dark reddish-brown, barrel-shaped puparium or shell from which the fly emerges by splitting off a cap at one end.

In winter the persistence of the species is apparently secured by the survival, in bake-houses, kitchens, stables and other suitable retreats, of flies which are the parents of the earliest broods of the following season. In the British Islands these latter usually commence to make their appearance in June, though as a rule it is not until the following month that the numbers of flies begin to show a marked increase. Generally speaking, in the absence of local conditions specially favourable to the breeding of the insects in abnormal numbers at an earlier period than usual (as at Post wick, near Norwich, in June July, 1910), house-flies in the United Kingdom are most numerous in the months of August and September but they are often still common in October, and sometimes even

in November. The occasional local occurrence of house-flies in such numbers as to constitute a veritable "plague" is generally traceable to one or more of the following factors:—(1) Exceptional meteorological conditions favouring abnormally rapid development (2) the local abundance of breeding places and of food-supplies for the maggots or larvae; (3) the presence, in the immediate vicinity, of a "tip" or dumping-ground for dust-bin refuse, on which, with the refuse, are continually being deposited large numbers of larvae and pupae, which have developed from eggs originally laid in a number of different centres.

Large numbers of house-flies are destroyed every autumn by a parasitic fungus (*Empusa muscae*, Cohn), which is the most effective natural enemy of *Musca domestica*; flies killed in this way may often be seen clinging to window panes and walls, attached to the supporting surface by outgrowths (rhizoids) from the fungus itself.

Since the house-fly breeds, as we have seen, in dung-hills and refuse heaps, and during its adult life alights and feeds indiscriminately upon human excreta as well as upon human food, it is obvious that grave results may ensue when house-flies and certain forms of disease exist together. Much has been written in recent years with reference to house-flies and the spreading of various human diseases of bacterial origin, and, although the experimental evidence is as yet incomplete, there can be no doubt that, under certain conditions, these insects act as carriers of cholera, typhoid fever, and tropical dysentery, while in connection with other maladies, such as infantile or summer diarrhoea, the house-fly at present rests under grave suspicion. Since this fly is incapable of biting, its action as a disease-carrier is contaminative, and therefore very different from that of an African tsetse-fly or a malaria-carrying mosquito, which is armed with a piercing proboscis. The germs of disease, if conveyed by a house-fly, are carried on the exterior of its legs, wings, head or body, or, as is more usually the case, in the insect's crop or intestine, and may subsequently be deposited on food or other substances. House-flies therefore become a serious menace to health when liable to contamination with disease-causing organisms, and should consequently be regarded as dangerous enemies, which should be destroyed and kept in check by every possible means.

The potentialities of the house-fly as a disease-disseminator in the poorer quarters of cities and in farmhouses and rural districts generally, quite apart from the annoyance and discomfort caused by its activities, especially when it is present in excessive numbers, render *Musca domestica* by far the most important of British insects from the standpoint of public hygiene. Under modern con-

ditions house-flies, except as "danger signals," serve no purpose useful to ourselves ; while, as just pointed out, they may at any time develope into a danger to human life, so that no one need have the slightest compunction in killing them. Obviously, however, it is of more importance to prevent house-flies from breeding, than, after allowing them to breed unchecked, to endeavour to kill the resultant broods when they have invaded houses.

Temporary accumulations of horse-manure should if possible be stored in fly-proof bins, while kitchen refuse should be deposited in completely closed receptacles, into which it should be impossible for flies to crawl. House-fly maggots, like many other Dipterous larvae, are tenacious of life, and although they can be killed, at any rate experimentally, by mixing with the manure or garbage in which they are feeding substances such as chloride of lime or sulphate of iron in solution, there are various practical difficulties in the way of such methods. In practice, therefore, the most important and effective means of preventing house-flies from breeding is the systematic removal, of all deposit of stable-manure and house-hold dustbin or ashpit refuse at least once a week. Since, as has recently been shown, house-flies are capable of flying to a distance of 1,700 yards, no municipal depot, contractor's dumping ground or "tip," where household refuse is allowed to remain for any length of time, should, if any other arrangement is possible, be established or permitted to exist within one mile and a half of the nearest habitations.

In military standing camps, where in hot or warm weather there is always a danger that house-flies may be bred in large numbers unless the methods of modern military sanitation be rigidly enforced, epidemics of typhoid fever may readily be caused owing to the joint presence of house-flies and human typhoid "carriers." Some form of incinerator should always be used for the destruction of stable-litter and other refuse, as well as of human excreta, which may contain the typhoid fever organism (*Bscitlus typhosus*), and in the latrines, whether trenches or pails be employed, some system of flyproof covers should be adopted. If the provision of such covers be rejected as impracticable, it rests with the responsible authority to ensure that earth is not only provided in sufficient quantity, but used in such a way as to render it impossible for flies to become contaminated.

Of the various means of destroying house-flies in rooms, those commonly in use are too well known to require mention. Flies on the wing may readily be knocked down and killed by means of a kind of racquet of flexible wire gauze (known as a "fly-killer"), provided with a wooden handle, and obtainable from iron-mongers. The best ready-made fly-traps, other than ordinary fly-papers, are

probably the "balloons" constructed of wire gauze, and "tangle-foot" tapes or other contrivances coated with a sticky gum. Good results are said to have been obtained by the use of a dilution of formalin in water, in the proportion of a teaspoonful of formalin to a teacupful of water. To make it more attractive to flies, the dilution may be sweetened with sugar or mixed with milk, and a soup-plate or other shallow vessel should then be partially filled with the mixture in the evening, and allowed to stand through the night on a table in a room in which flies are troublesome. Provided that all other liquids from which the insects could drink have been removed or securely covered, the flies will sip the mixture in the early morning, and a little later may be swept up dead a short distance away. Formalin diluted to the extent mentioned is not dangerous to man, and this method may be used without hesitation even where food is exposed.

It is said that paraffin, if rubbed on the sashes and bars of the window, will kill all the flies in a room; this method at any rate possesses the merits of simplicity and cheapness.

So far as possible, human food—especially such substances as cooked meat and milk and sugar, which are especially attractive to these insects—should always be protected from flies by covers of wire-gauze or muslin, and house-flies should not be allowed to settle upon persons suffering from infectious or contagious diseases. Rigorous precautions should, of course, be taken to prevent house-flies from coming into contact with the sputa of consumptives, or with the evacuations from cases of cholera, typhoid fever, summer diarrhoea and other intestinal disorders. No system of sanitary control can be regarded as efficient, which allows flies to have access to material containing the germs of disease.

H. C. P.

KAJANG DISTRICT PLANTERS' ASSOCIATION.

Minutes of General Meeting held at Kajang 4 p.m., 7th November, 1913.

Present. C. Burn Murdoch (Chairman), D. C. P. Kindersley, T. S. Dumbreck, K. G. Furley, A. C. Hayton, C. G. Jeavons, P. K. Paul, A. A. Mulloy, P. Butler, G. F. Tyler, H. Gough, F. B. Kendall, G. D. F. Sinclair E. W. King, C. R. Ferrers, P. F. Wise, E. M. Schwabe, F. St. Barbe, E. W. Tyler, R. Drummond-Hay, C. P. Everard, H. R. Moullin, H. W. Rickeard, F. B. Gough.

Visitors. P. Trump, E. B. Skinner. Oliver, J. Mayer.

1. Before confirming the minutes of last meeting it was proposed by D. Kindersley and seconded by P. F. Wise that in the resolution re the Roads in the Kajang District the words "of some" be inserted between "of" and "the"—the resolution now reading

"that the attention of Government be brought to the very bad state of some of the roads" etc. With this alteration the minutes were passed.

2. COOLIES, WAGES.

The Chairman introducing the subject said—The question now before the meeting is the reduction of wages. This Association has already agreed to reduce Chinese and Javanese wages, and in the case of these classes of Labour the reductions, I believe, have already been made without any serious difficulty. The rates now ruling are Chinese 60 cts., Javanese 40 cts., and Malays 45 cts. These rates are the same as the rates recently passed by the Klang D. P. A. with the difference of 5 cts. to Malays.

The time has certainly come when the Tamil rates should be reduced, perhaps reduced is hardly the word, but brought back to something nearer the rates ruling before the boom. As pointed out by the Chairman of the Klang D. P. A. the Coolie now arrives free and yet his rates have gradually risen from 30 cts. to 40 cts., in many places.

At the recent meeting of the P. A. M. the question of reducing Tamil rates was brought up and it was then clearly recognised that for the reduction to be really effective, unanimity of the whole country was required, not only of Planters but of Miners and Government Departments.

I have purposely not said anything about tasks and hours. If this Association will agree to the rate of wages it will be better, I think, for each individual to work to that wage and see that he gets its value. The conditions on Estates differ so widely that I do not see how tasks can be fixed. The proposition I now make will bring our rates down proportionately to those of the Klang D. P. A. I propose therefore "that the maximum rates for Tamils be from the 1st. January 33 cts. for men and 25 cts. for women and all Sunday names be abolished." Seconded by G. D. F. Sinclair. Mr. Mulloy pointed out that he would not be able to reduce to these rates at once but would reduce proportionately now and hoped to reduce further later. His estate is an outlying one.

The Chairman said that naturally cases of this sort would receive consideration at the hands of an appeal Committee. After some further discussion the resolution was passed unanimously, and the Secretary was instructed to send copies of the resolution to the Secretaries and Agents of estates in the District in addition to the usual publication in the papers.

3. APPEAL COMMITTEE.

Mr. Kindersley proposed that all questions of difference in rates of pay from those defined be referred to the General Committee. Seconded by E. W. King, and carried.

4. Labour Delegates to P. A. M.

The Chairman said that at the last meeting of the P. A. M. it was proposed that each D. P. A. should nominate 2 delegates to meet and confer on the question of reduction of wages. These delegates need not necessarily both be planters.

Mr. P. Trump of the P. W. D. on being asked if he would act as one of the delegates expressed himself as willing provided the Government raised on objection.

The Chairman and Mr. D. Kindersley were elected as delegates provisionally.

5. Locusts.

The attention of the meeting was drawn to the letter from the Director of Agriculture which had been sent out to all members.

The Chairman mentioned that so far only two answers had come in. Mr. Schwabe hoped that every one would reply promptly as he knew this district was anxious to do everything in its power to help towards eradicating the pest. Correspondence on this question was quoted shewing that even as far back as Oct., 1912, this Association viewed the locust pest with alarm and offered their help.

6. Roads.

Mr. E. W. King proposed the following resolution—"That in bringing forward their former resolution, this Association did not wish to compare this district invidiously with the neighbouring districts, but would ask them to join in calling the attention of the Government to the present state of some of their roads."

The Chairman seconded and in doing so said he was glad of this opportunity to express his regret that the wording of the resolution passed at the last meeting, and which he had seconded, had conveyed a wrong impression.

DEPARTMENTAL NOTES.

Mr. H. H. Stirrup has been appointed Assistant Agriculturial Inspector, Department of Agriculture, F.M S.

Mr. J. N. Milsum, Assistant Superintendent, Government Plantations. Selangor and Negri Sembilan, Department of Agriculture, F.M.S., arrived at Kuala Lumpur and assumed his duties on 29th November.

Mr. F. T. Brooks has been appointed as Mycologist, Department of Agriculture, F.M.S.

FEDERATED MALAY STATES.

Comparative Statement of Cultivated Rubber Exported, with Value and Duty Collected Thereon, during the Years 1913 and 1912.

Destination.	Exported during October, 1913.	Previously.	Total export during the year.	Export during similar period of previous year.	Increase.	Decrease.	Value of rubber, 1913, to date.	Duty collected, 1913, to date.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	$	$ c.
Straits Settlements ...	1,140.41	7,404.58	8,544.99	5,121.60	3,423.39	...	21,907,761	544,892.05
United Kingdom ...	861.57	7,759.06	8,620.63	6,165.24	2,455 39	...	22,728,771	568,219.25
Continent of Europe ...	111.15	1,013.86	1,125.01	842.02	282.99	...	2,983,908	74,597.70
Ceylon	47.54	450.26	497.80	321.67	176.13	...	1,339,068	33,476.70
Other Countries ...	...	...	...	10.45	...	10.45	...	...
Total ...	2,160.67	16,627.76	18,788.43	12,460.98	6,337.90	10.45	48,959,508	1,221,185.70

KUALA LUMPUR,
6th November, 1913.

W. J. P. HUME,
Commissioner, Trade and Customs, F.M.S.

Abstract of Meteorological Readings in the various Districts of Malaya for the Month of October, 1913.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	TEMPERATURE.				HYGROMETER.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Kota Bahru	...	144.	80.8	89.51	73.70	15.81	76.8	.843	74.1	.80%	...	9.28	2.50
Malacca, Durian Daun Hos.	29.895	148.8	81.3	86.4	71.8	14.6	78.5	.936	...	.88	N. W.	16.51	2.34
N. Sembilan, Dist. Hospital Seremban	...	150.1	78.7	89.9	71.3	18.6	75.3	.817	73.2	.83		9.40	2.73
„ Dist. Hos. K. Pilah	...	155.2	80.2	...	...	...	77.4	.888	75.6	.86	...	7.84	1.97
„ „ Tampin	...	152.	80.5	87.4	73.1	14.3	76.	.828	73.	.78	...	11.75	3.20
„ „ P. Dickson	...	158.3	81.5	87.2	74.1	13.1	77.2	.850	74.3	.79	...	11.51	2.19
Pahang, „ K. Lipis	...	...	79.8	88.9	67.8	21.1	75.8	...	...	...	...	10.80	1.25
Penang, „ Penang	29.846	138.3	80 1	86.2	72.7	13.5	76.5	.862	74.1	84.6	...	16.88	2.10
Perak, „ Taiping	...	106.	79 99	94.	72.	22.	75.80	.839	...	.82	...	28.97	4.01
„ „ Ipoh	...	...	80.32	92.	70.	22.	79.95	.840	...	.82	...	14.53	3.72
„ „ T. Anson	...	...	80.96	92.	69.	23.	77.18	.883	...	.85	...	6.10	.90
„ „ P. Buntar	...	...	79.99	90.	72.	18.	76.17	.852	...	.85	...	14.57	2.64
„ The Cottage	...	...	...	...	...	...	...	...	...	...	...	33.55	2.95
Selangor, General Hospital Kuala Lumpur	...	145.6	81.	89.4	77.	12 4	78.1	.887	76.1	.85	...	5.35	1.15
„ Dist. Hos. Klang	...	...	79.8	86.6	73.2	13.4	75.7	...	...	...	...	9.84	2.43
„ „ K. Selangor	...	...	...	87.9	74.4	13.5	...	...	...	...	...	6.21	2.25
„ „ Rawang	...	...	...	90.9	71.7	19.2	...	...	...	...	...	6.94	1.44
Singapore, Kandang Kerbau Observatory	29.922	159.5	83.	92.	71.	21.	75.5	.883	...	.79	.S W.	10.50	3.06